

# Solar Radiation Measurements in Brazil by Using Satellite Techniques

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A radiation model originally developed in Germany (GKSS-Geesthacht) was adapted and improved to operate in Brazil by a joint collaboration between the Federal University of Santa Catarina (UFSC) and the Brazilian National Institute for Space Research (INPE). It is a physical model that employs the visible narrow-band response of a geostationary satellite to estimate the broadband solar radiation at surface. The model was validated by using surface pyranometers and is in operation since 1995. The first edition of Brazilian national Satellite Atlas of Solar Radiation has just being issued in conjunction with the Brazilian National Institute of Meteorology (INMET). This presentation is a review of this model, the latest improvements, and the main results of its application in Brazil. The model is being improved to take into account some local environmental characteristics that are only poorly assessed so far. The intensive cloud convection which is associated with the inter-tropical con-

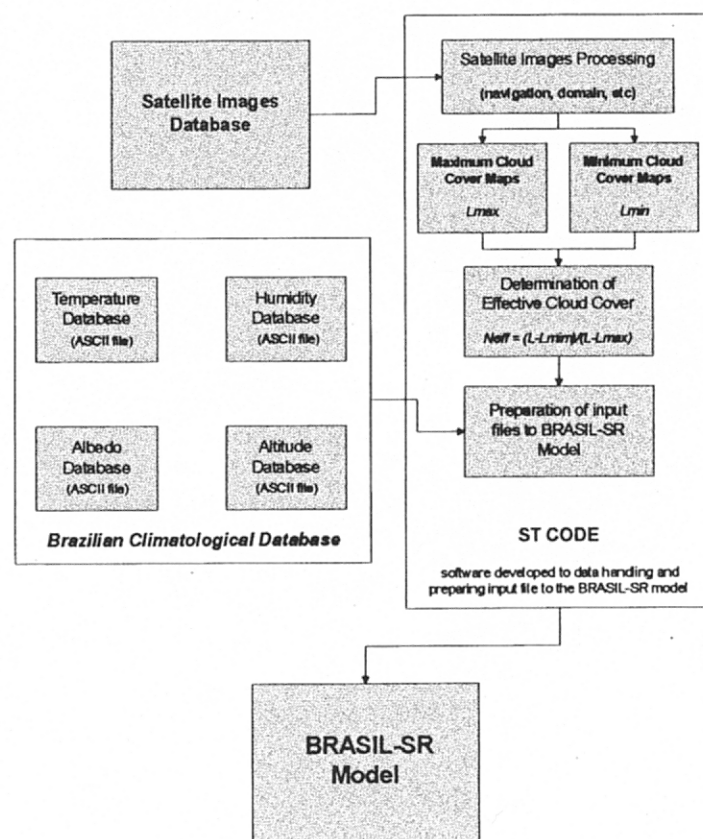
vergence zone (ITCZ); and the manmade changes in the biosphere-atmosphere interaction, triggered by deforestation and land clearings are among the most important factors. The development of specific procedures of cloud screening and surface validation of cloud fraction will be described. In addition, it will be reported the first results of a study aimed at the estimation of the effects of biomass burning combustion byproducts injected into the atmosphere by the widely used practice of land clearings for farming and cattle growth. The magnitude of this effect, however, remains a controversial issue particularly as regards to the aerosols.

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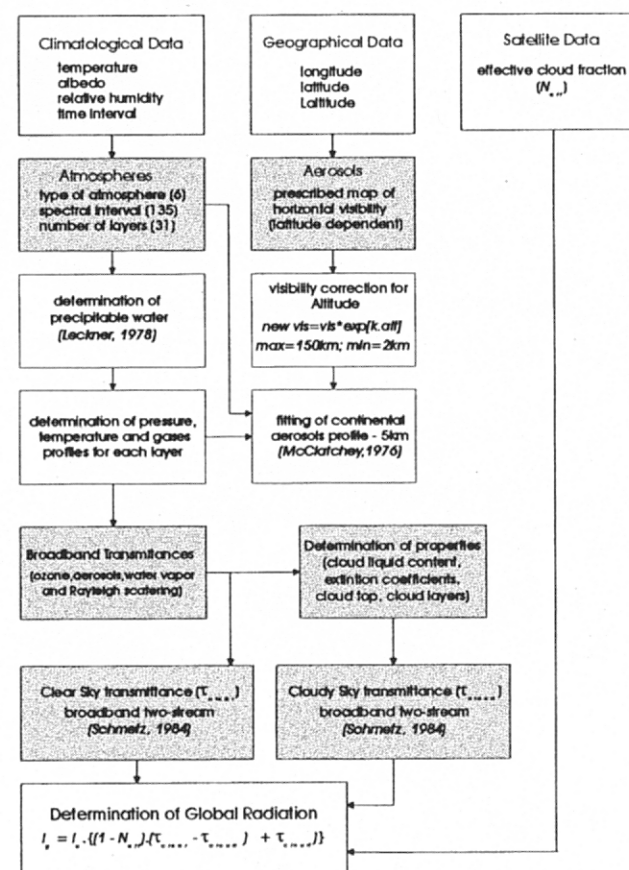
# Block diagrams of the BRASIL-SR satellite model

(A) Input of satellite data and model parameters

(B) Radiation transfer model



A

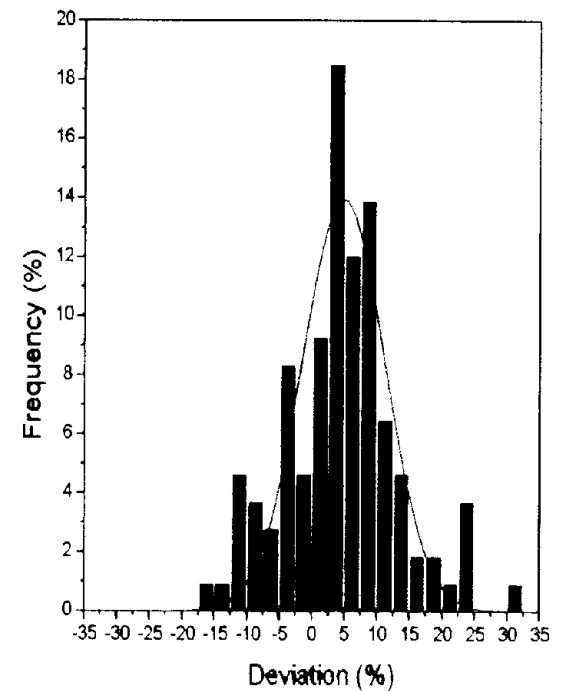
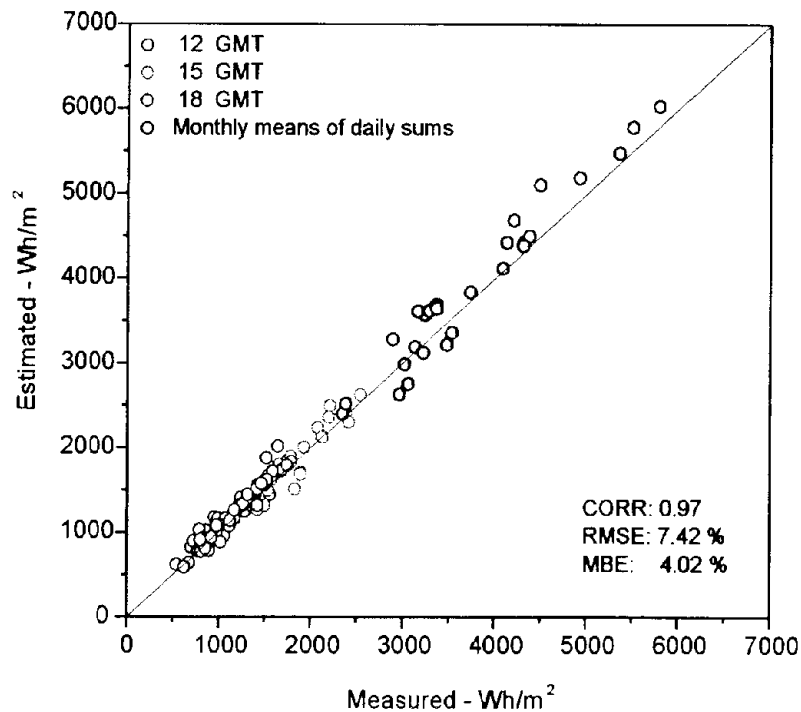


B

# Model versus measured solar irradiation

BSRN - Florianópolis (27.60° S 48.57° W)

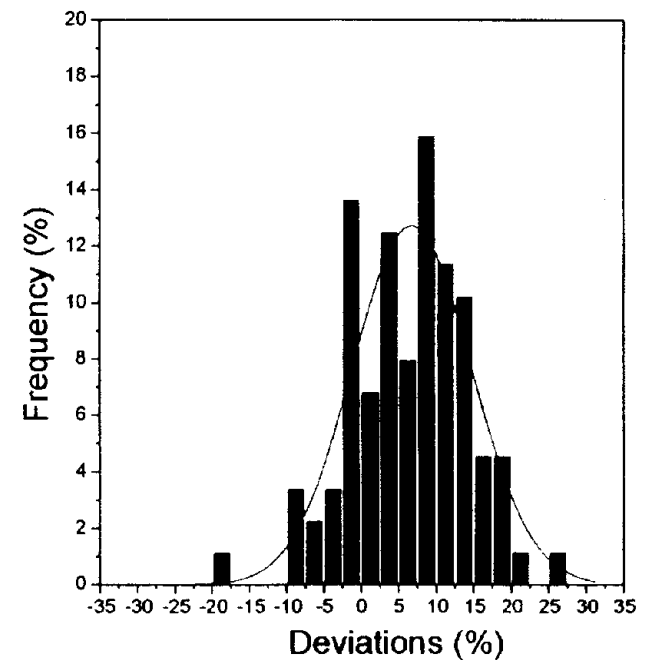
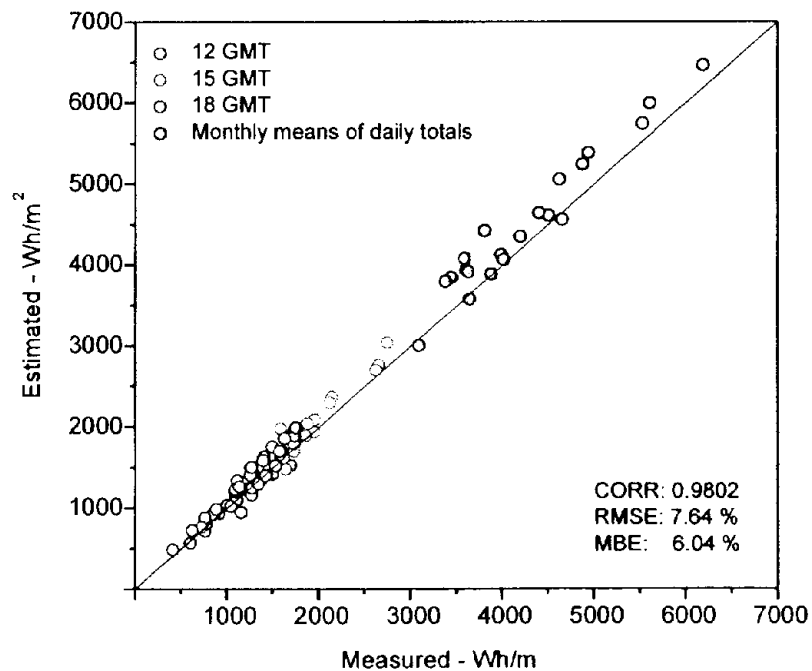
altitude 10 m



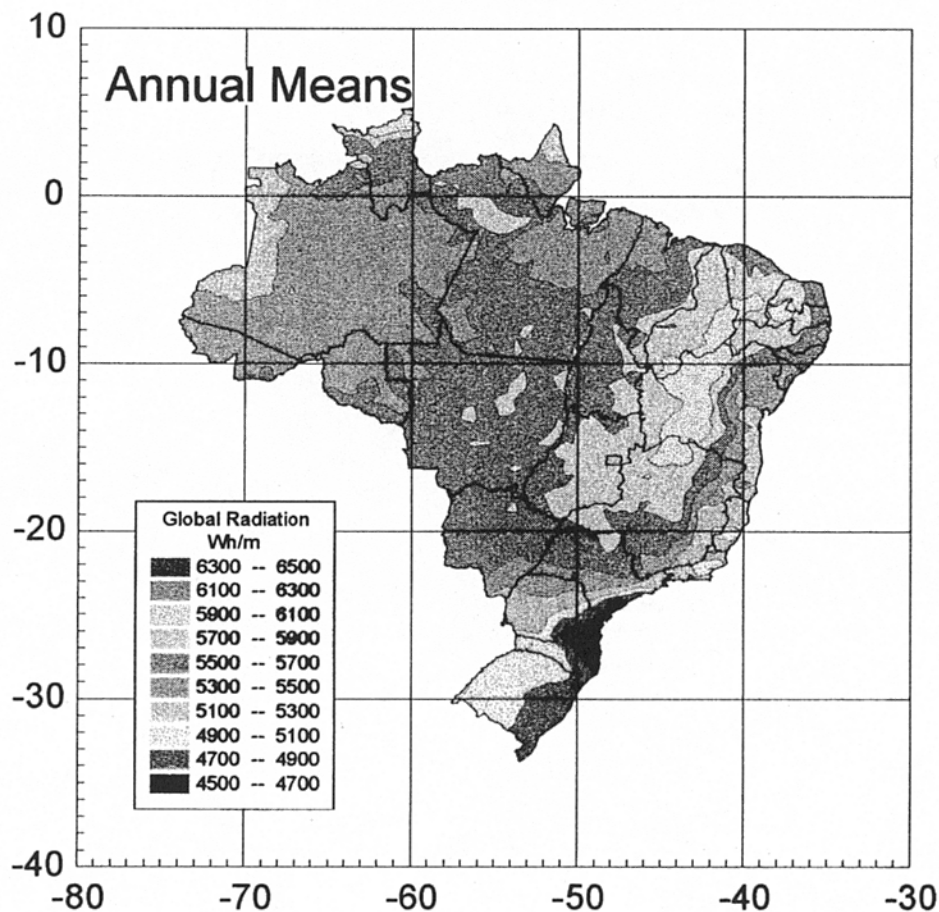
# Model versus measured solar irradiation

Lebon Regis (26.98° S 50.71° W)

altitude 1036 m

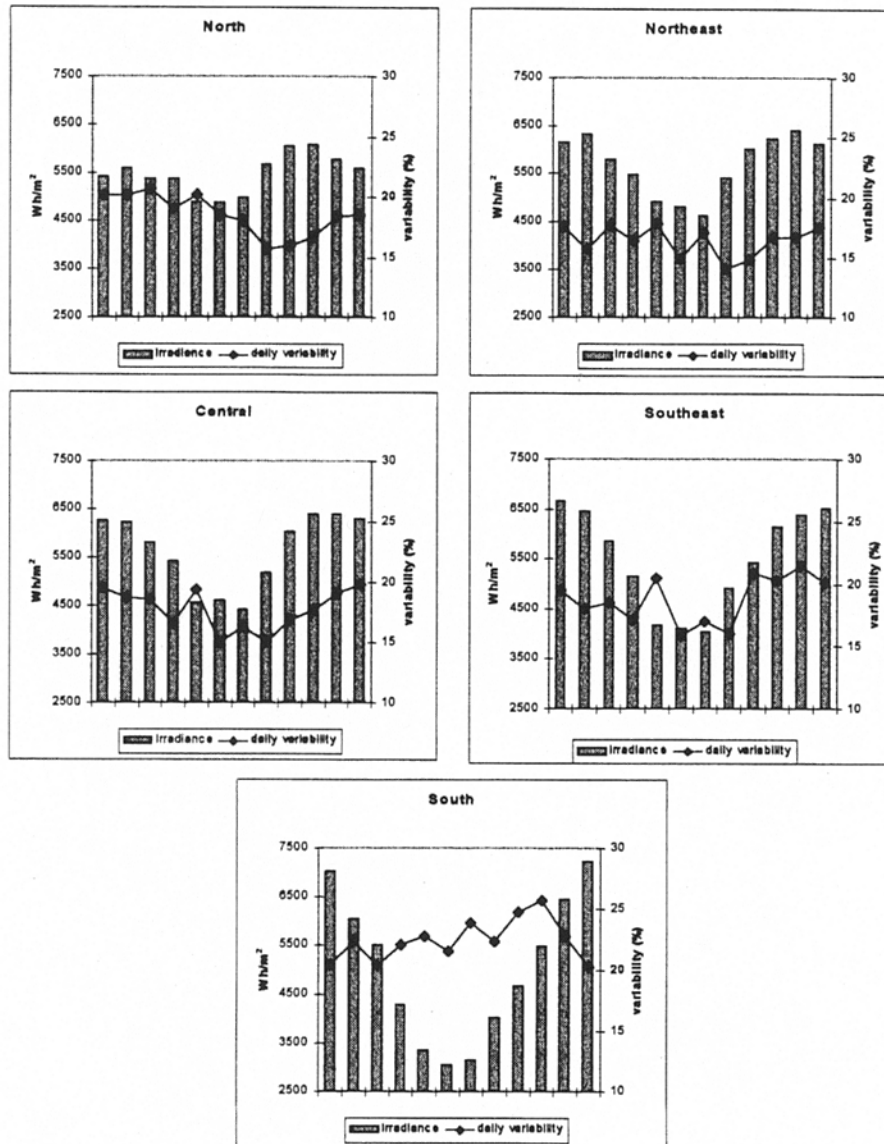


# Mean Annual Global Horizontal Solar Irradiation and Monthly Deviations from the Annual Mean

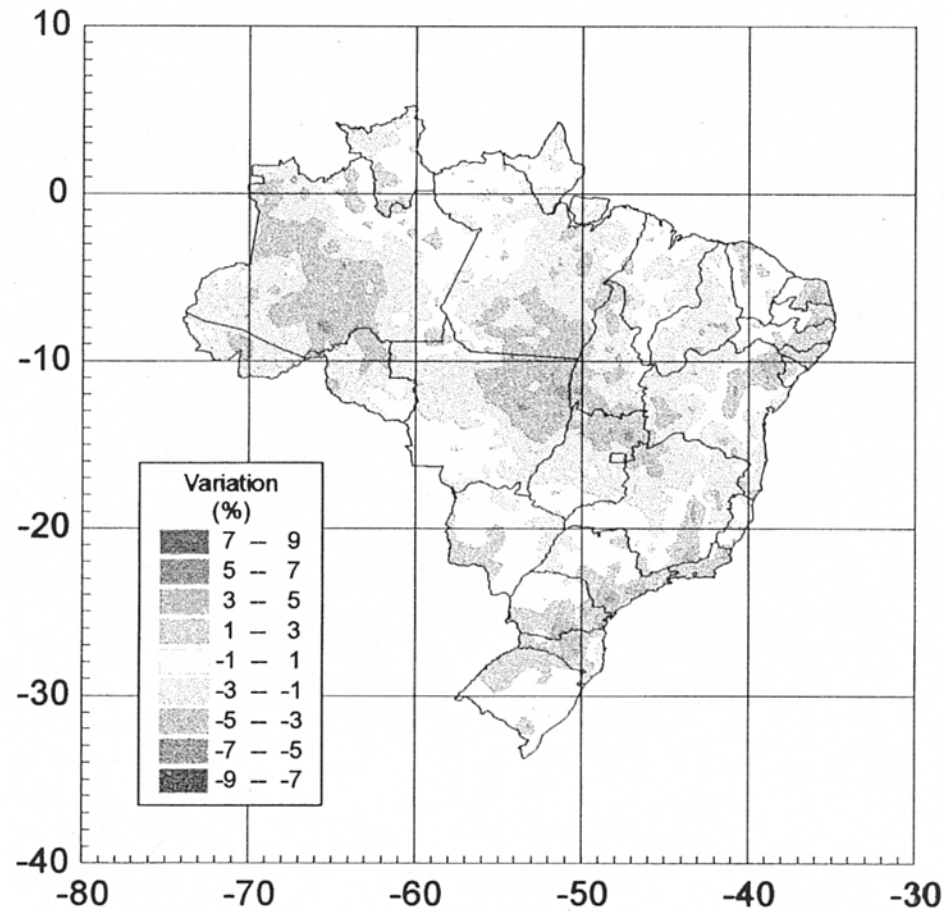


# Regional Variability of the Solar Irradiation

(for the five main climatic areas of Brazil)

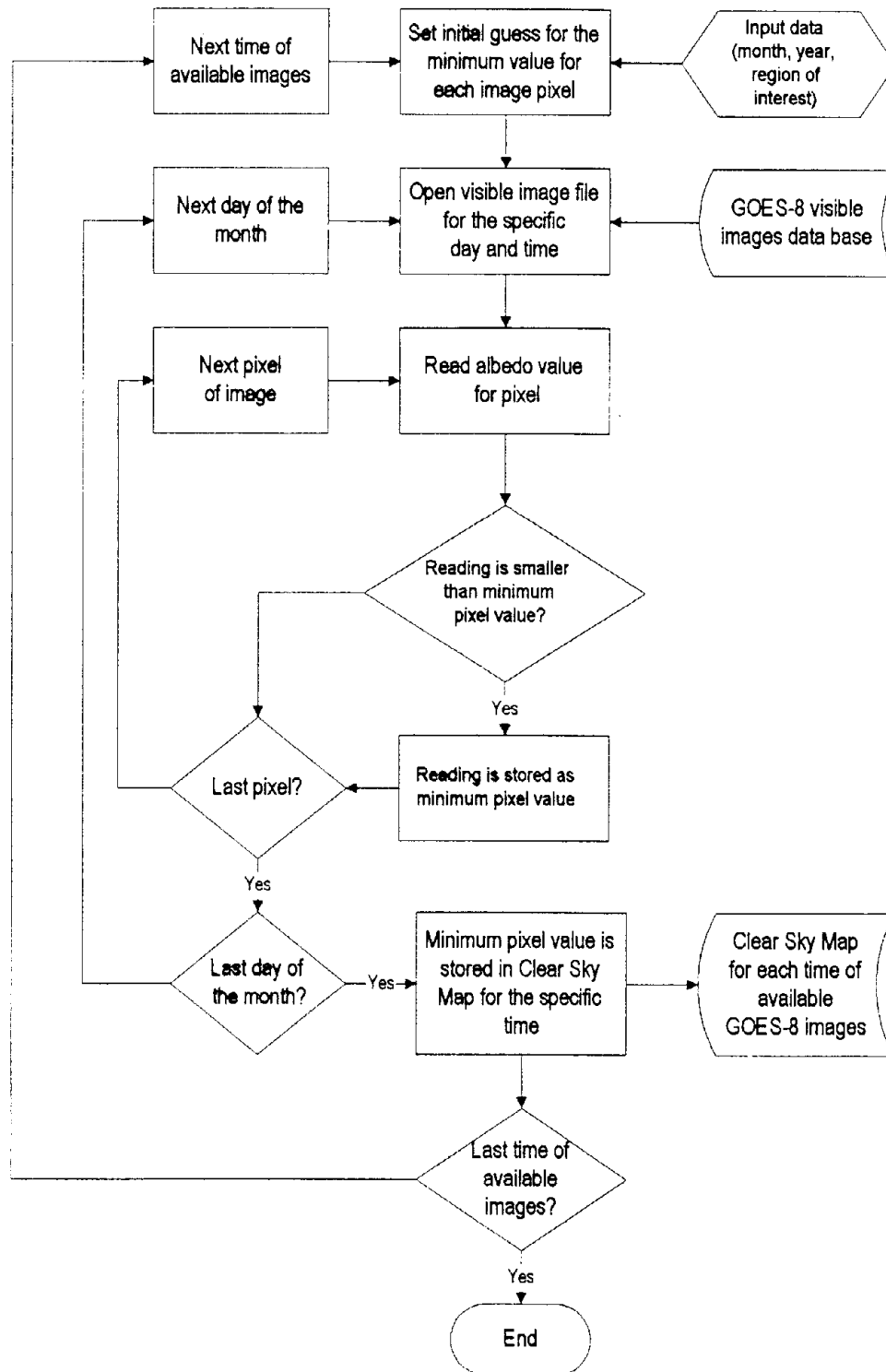


# Inter-annual Relative Variability (1996 - 1997)



# Block Diagrams of Clear Sky Composite Image

## Minimum visible value - Method #1 (Standard in BRASIL-SR)





# Block Diagrams of Clear Sky Composite Image

## Average of five smallest visible values - Method #2

